

A.1: Executive Summary

Nevada Irrigation District - Centennial Water Supply Project Water Storage Investment Program

1. Describe the project facilities and operations.

Nevada Irrigation District's (NID) water supply system is a "store and release" system, in that reservoirs store snow melt and seasonal rains for release during the typically dry irrigation seasons. Based on the timing of seasonal events, NID's water supply management is dependent on a combination of springtime snowmelt and winter period rains to fill existing storage reservoirs. While there is some natural runoff during the summer months, much of this water is required to meet necessary environmental flows in the rivers; therefore, the irrigation season demand is met primarily with withdrawals from storage reservoirs. Careful management and operation of storage reservoirs is essential to capture the maximum amount of runoff, minimize spillage from reservoirs, and ensure there is sufficient area available in reservoirs to accommodate runoff during the spring snow melt and storm events.

NID's water supply comes from four main sources: natural runoff (including snowmelt) from the contributing watershed area, carryover storage, contract water purchases, and recycled water. NID's existing system capability is able to meet customer demands based on available water from these four sources.

As water demand within NID's service area increases, events such as drought and climate change create challenges for NID in maintaining a sustainable water system. According to NID's Raw Water Master Plan (2011), studies indicate that the margin between average watershed runoff volume and demand is diminishing. Increased future demands in the service area will result in increased demand on water storage and greater drawdown of NID's reservoirs, especially during summer months when there is little natural runoff.

Currently, NID's water system relies too heavily on the water bank provided by the annual mountain snowpack. With warmer temperatures likely, NID needs mid-elevation storage that can capture runoff from rainstorms and snowstorms from both the mountain division and the lower division watersheds. Without this capability, NID will be unable to sufficiently collect and conserve water and prepare the region to weather extended droughts. NID's goal is to continue to provide a dependable, sustainable, high-quality water supply to its customers. NID needs this Proposed Project to offset anticipated system deficiencies, taking into

consideration increasing customer demands and the likelihood of regularly occurring multi-year droughts due to seasonal hydrologic variability exacerbated by climate change.

NID is proposing to construct the Centennial Reservoir (Proposed Project) to provide drought and climate change relief and improve water supply reliability for NID's customers. The Proposed Project involves the construction of a new dam that would form a 110,000 acre-foot reservoir on the Bear River between the existing Rollins Reservoir and Combie Reservoir. The Proposed Project would extend upriver from just above the existing Lake Combie for slightly over six miles to a point west of the Town of Colfax, approximately two miles downstream of the existing Rollins Dam. Low impact public recreational opportunities are anticipated to be included with the Proposed Project. A new raw water conveyance pipeline to serve NID customers adjacent to the proposed reservoir on the Nevada County side, as well as a Bear River bridge crossing to replace the existing bridge crossing are also included as part of the Proposed Project.

Additional detail about the project and its operations are found in the Eligibility Tab, A.3 Project Description and the Benefit Calculation, Monetization, and Resiliency Tab, A.2 Project Operations.

- 2. Describe how the project is integrated into one or more state water systems, including use of new water sources such as recycled water or storm water capture. The summary must include information such as the project's inclusion in an integrated regional water management plan, other integrated planning documents, or interactions with existing projects and operations that support the description of integration.**

NID's current service area covers 287,000 acres in Nevada and Placer counties providing water supply for irrigation, municipal, domestic and industrial purposes. NID also has storage reservoirs and distribution facilities in Sierra and Yuba counties.

NID currently has water supply networks and storage facilities located in four major watersheds: 1) the Middle Yuba River; 2) tributaries of the South Yuba River; 3) Deer Creek; and 4) the Bear River. All four of these watersheds ultimately flow into the Feather River, and are part of the Sacramento River basin, which drains into the Sacramento-San Joaquin Delta, and then into San Francisco Bay. Figure 1 illustrates the general regional location of the NID's existing water supply network and storage system.

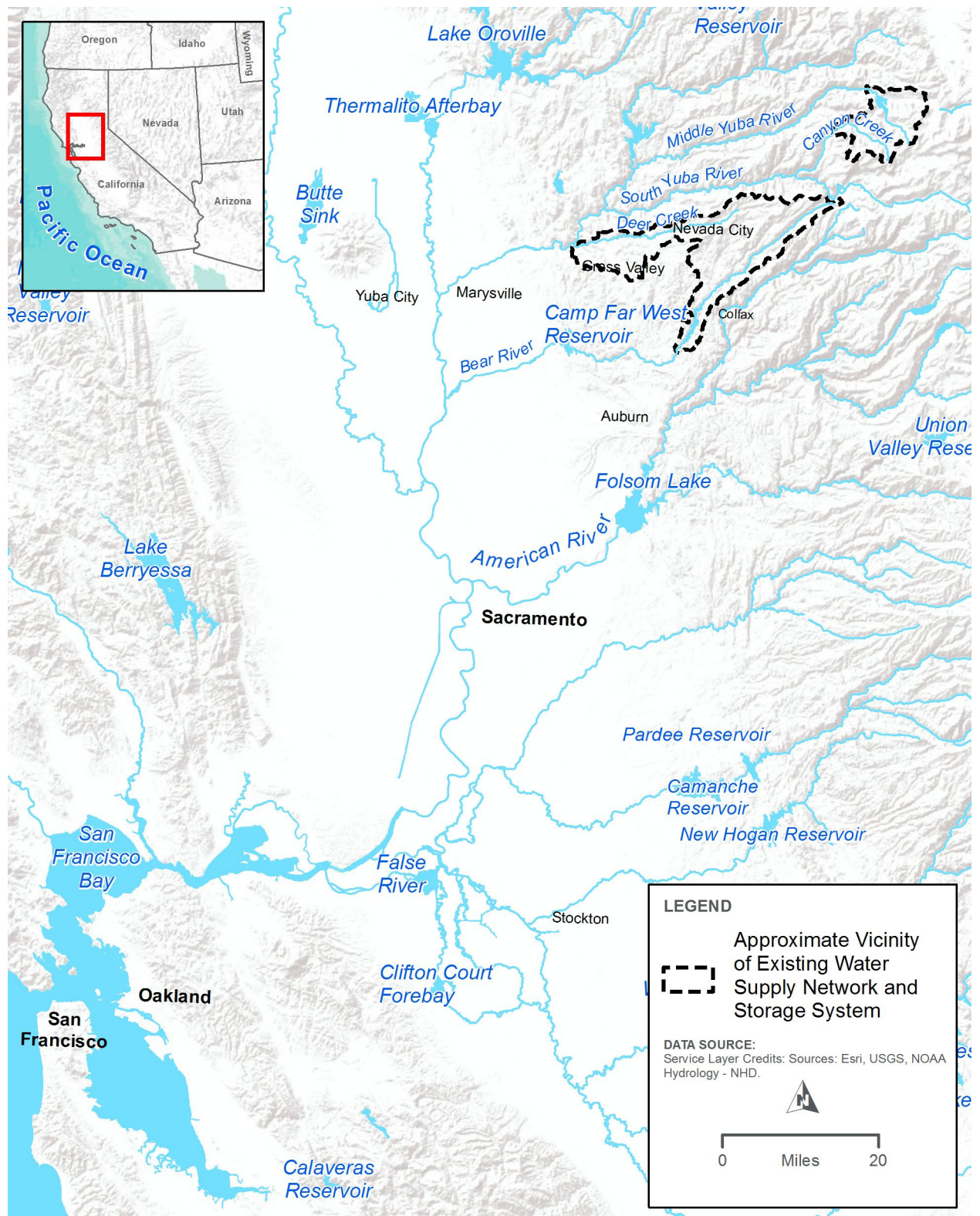


Figure 1: Regional map showing the location of NID's existing water supply network and storage system.

Facilities located in the Middle Yuba and South Yuba river watersheds belong to NID's Mountain Division. From Mountain Division reservoirs and diversions, NID water flows through the Bowman-Spaulding Canal to Pacific Gas and Electric's (PG&E's) Lake Spaulding. It is then routed down either the South Yuba Canal to the Deer Creek watershed, where water is then supplied to NID customers in Scotts Flat and the Nevada City-Grass Valley area, or down the PG&E Drum System along the Bear River where the water is used to generate power for NID and PG&E before supplying NID customers in southern Nevada County and Placer County through various diversion facilities. Collectively, these facilities make up NID's Yuba-Bear system.

NID's Yuba-Bear Hydroelectric Project is operated in conjunction with PG&E's Drum-Spaulding Project under a consolidated contract. NID and PG&E established a Water Management Committee that meets regularly to coordinate reservoir and canal system operations. The committee operates the joint system with the following objectives and priorities:

- Operate NID's system in conjunction with PG&E's Drum-Spaulding system to maximize the use of water for power generation and consumptive use, and minimize spillage;
- Water supply needs and regulatory requirements are given the highest priority; power generation and recreation are given a lower priority.
- Operate to maximize reasonable and beneficial uses within NID's water rights.
- Fulfill all requirements of contracts/agreements (PG&E, Placer County Water Agency [PCWA], California Department of Fish and Wildlife, State Water Resources Control Board, Federal Energy Regulatory Commission [FERC], customers, special agreements, etc.).

Supporting Studies

The following previous studies by NID and others were referenced during development of project alternatives to meet future demands for water within the NID service area.

NID Raw Water Master Plan 2011

NID's Raw Water Master Plan (RWMP) from 2011 is the second update to its 1985 RWMP. The purpose of this series of reports is to: 1) verify water supply, quantify expected future demand, and evaluate the adequacy of the existing water conveyance system to accommodate current and future

demand; and 2) identify capital improvement projects required to meet future demand for water within the NID service area. The 2011 update focuses on the latter of the two.

Major Findings/Conclusions

Major findings related to the adequacy of the existing storage conveyance system in the RWMP include:

- By 2032, projected consumptive demand is expected to approach the average annual runoff volume from NID's watersheds.
- Climate change forecasts estimate that the temperature by mid-century will increase by as much as 5 degrees Celsius and will reduce NID's Mountain Division snowpack by as much as 40 percent. Precipitation will fall as rain instead of snow as the snow line moves higher in elevation. Variations between wet years and dry years will become greater, resulting in greater flood potential and longer, more intense drought periods.
- By 2032, forecasted water supply will be sufficient to address a single dry year without restrictions, but not a multi-year drought period.

The following sections summarize measures identified in the RWMP, as updated, to meet future demand for water within the NID service area.

Increase Conservation – District Facilities and Service Area

Conservation should become routine rather than the first step under a drought contingency plan. Conservation measures include improving customer delivery efficiencies and strategies, managing NID land use development and best practices in watersheds, refining of system operations.

Reduce System Losses

Overall system losses are estimated to be approximately 10 percent of customer delivery volume. While it is infeasible to phase out all open-ditch delivery systems within NID's service area, canals with the highest loss rates and maintenance issues are being prioritized for containment and/or potential improvement. Alternatives for reducing system losses for open ditches include installation of impervious lining or piping of flows.

NID has already begun to make improvements to existing ditches. Completed improvement projects include the Banner-Cascade pipeline project, the Cunningham siphon realignment project, the Drum-Spaulding Canal flume replacement project, and the Mount Vernon Road siphon

project. Current ongoing improvement projects include the Combie Phase I Canal, Bear River Siphon Replacement Project, and the Newtown Canal partial encasement project.

Increase Reservoir Storage

Increasing reservoir storage would provide drought and climate change mitigation, meet projected future water supply needs, and improve water supply reliability for NID customers. Two ways to increase reservoir storage include dredging of existing reservoirs with high rates of sediment accumulation, and by creating additional storage by raising existing dams or constructing a new dam.

2015 Capital Improvement Program for the RWMP

NID's existing water delivery system was further analyzed in the 2015 Capital Improvement Program (CIP) analysis, to determine flow requirements in individual canal segments under 2032 projected demands. Canal segments were identified for potential upgrade to provide more capacity and conveyance capability. Segments were evaluated based on: (1) facility importance; (2) capacity; (3) difficulty of construction; (4) environmental constraints; and (5) NID input. The analysis identified the number of appurtenances (e.g., spoils, checks, and gaging station) and linear objects (e.g., flumes, open channel canals, and siphons) included in each canal segment. The evaluation process was used to prioritize various capital improvement projects.

1957 DWR California Water Plan (Bulletin No. 3)

The California Water Plan is a state-wide master plan to guide and coordinate the planning and construction by all water agencies for the control, protection, conservation, and distribution of California's water resources for the benefit of all areas of the State and for all beneficial purposes. The report served to evaluate both existing supply and future demand, and identify watersheds with surplus water resources.

The California Water Plan considered the Yuba and Bear rivers as a single unit, as it described potential development within these two watersheds. The following bulleted list identifies projects for future development that are relevant to NID:

- New diversion and diversion tunnel from the North Fork Yuba River below Haypress Creek to proposed Jackson Meadows Reservoir. Water would then be diverted to Lake Spaulding (existing) and then to the Bear River.

- New diversion and diversion tunnels at Fordyce Creek, Rattlesnake Creek and the South Yuba River to an enlarged Lake Valley Reservoir. Water would be returned to the South Yuba River at Lake Spaulding (existing) through a new power drop.
- Increased diversions out of Lake Spaulding (existing) through the existing Drum and South Yuba canals.
- New Canal and power drop into proposed Rollins Reservoir, downstream of Dutch Flat Powerhouse (Chicago Park).
- New Rollins Reservoir and Powerhouse
- Increase the existing South Yuba Canal capacity
- Increase the capacity of Scotts Flat Reservoir (existing)
- Increase the capacity of Spaulding #2 and Deer Creek powerhouses (existing)

The California Water Plan identified future development possibility on the Bear River totaling 342,000 acre-feet (ac-ft), 100,000 ac-ft for the proposed Rollins Reservoir and 242,000 ac-ft for an enlarged Camp Far West Reservoir. Construction of Rollins Reservoir was completed in 1965 by NID and Camp Far West was enlarged in 1963 by South Sutter Irrigation District. Current gross storage in this reach (Rollins Reservoir, Lake Combie, and Camp Far West Reservoir) is approximately 176,000 ac-ft. The remaining balance, 166,000 ac-ft, indicates additional development capacity within the watershed.

1926 NID Reconnaissance Project on Bear River

NID's initial development plan of the Bear River (as of May 1924) included a diversion dam on the Bear River below Greenhorn River (Rollins), a dam on South Wolf Creek, and a diversion canal between the two. It was noted that this plan was flawed because of the prohibitive cost to construct the South Wolf Creek Reservoir. The purpose of the 1926 Bear River reconnaissance project was to consider alternative dam sites to replace the proposed South Wolf Creek Reservoir.

Four potential dam sites were investigated: 1) Rollins, 2) Combie Crossing, 3) Dog Bar, and 4) Parker. The following conclusions were made based on the reconnaissance project:

- The Rollins Dam site is not favorable because of the relatively steeper channel gradient than the other sites, and it would quickly fill with mining debris.

- The Combie dam site is adequate, but the stream bed is at an elevation of 1,500 ft, which is less than the optimal 1,700 ft elevation required to serve Penn Valley.
- The Dog Bar Dam site is adequate, but is wider than the dam site at Parker, making it a more expensive option than Parker. Also, Dog Bar reservoir storage relative to the dam height would be less than for Parker reservoir storage.
- The Parker Dam site is the best and most economical reservoir site for storage of water on the Bear River.

Based on its findings that the Parker Dam site was the best location for a new dam on the Bear River, the reconnaissance project included results of a topographical survey of the potential inundation area and a cost estimate for a rock fill dam of various heights ranging from 130 ft to 330 ft. A diversion tunnel was proposed from Parker Reservoir to serve Penn Valley. This tunnel is no longer a proposed feature of the project. The Parker Dam site is generally consistent with the present day proposed Centennial Dam site.

2015 Urban Water Management Plan

Urban Water Management Plans (UWMP) are prepared by California's urban water suppliers to support their long-term resource planning, and ensure adequate water supplies are available to meet existing and future water demands.

Every urban water supplier that either provides over 3,000 ac-ft of water annually or serves more than 3,000 customers is required to assess the reliability of its water sources over a 20-year planning horizon and prepare an UWMP every five years.

NID's UWMP includes a description of the water supply sources, magnitudes of historical and projected water use, and a comparison of water supply water demands during normal, single-dry, and multiple-dry years. Also described is NID's water conservation program and drought contingency Plan.

UWMPs are to be adopted and submitted every five years to the California Department of Water Resources (DWR). Therefore, the 2015 UWMP builds upon, updates, and reports on data since the 2010 UWMP.

2012 Agricultural Water Management Plan

The Agricultural Water Management Plan (AWMP) was prepared by NID in accordance with California Water Code Section 10820 (a), which requires all agricultural water suppliers that provide water to 10,000 or

more irrigated acres to prepare a plan every five years. According to the California Department of Water Resources, the AWMP Act states that agricultural water suppliers should make every effort to assure the appropriate level of reliability in its water service to sufficiently meet the needs of its customers during normal, dry, and multiple dry years. The AWMP includes descriptions of the service area, water supplies, water balance, climate change and efficient water management practices, including the Drought Contingency Plan.

Drought Contingency Plan

NID adopted an updated Drought Contingency Plan in November 2015 to address limited water supplies due to either drought conditions or distribution infrastructure failures. The primary objective of this Plan is to identify water demand reduction goals and to recommend demand management measures. The Drought Contingency Plan is a supplement to NID's UWMP and AWMP. The plan involves the calculation of projected supply shortages at the end of the runoff season (typically late spring) and the implementation of a demand reduction goal, if applicable.

3. Describe how the project increases the flexibility of the water system(s) it is integrated with, including references to analyses, data, documents, or studies included in other parts of the application that support the added flexibility.

The proposed Centennial Reservoir would operate as a "fill-and-spill" project, with a prioritization of maximizing reservoir storage during the winter and early spring runoff period. During the water delivery period (late spring through early fall), Centennial Reservoir would be used in coordination with NID's existing reservoir network to provide water to customers in NID's lower Bear River watershed service area. Centennial Reservoir would be managed in coordination with NID's Rollins Reservoir upstream, as well as Lake Combie downstream, with diversions made to PG&E's Bear River Canal and NID's Combie Phase I Canal (see Figure 2). Centennial Reservoir will be used in conjunction with NID's existing Rollins Reservoir to expand the total storage capability in the Bear River watershed, allowing NID to capture additional natural runoff in the Bear River watershed.

Under without-project conditions, releases from Rollins Reservoir are made to meet NID and PG&E's Bear River Canal Diversion Dam diversion demands, and releases to the Bear River below the Bear River Canal Diversion Dam located immediately below Rollins Reservoir. Releases to the Bear River are typically the maximum of 1) NID's diversion demand in the Combie Phase I Canal at Lake Combie, or 2) the FERC license

minimum instream flow requirement. In most months the Combie Phase I Canal demand exceeds the minimum instream flow requirement.

Under With-project conditions, releases to the Bear River below the Bear River Canal Diversion will meet the minimum instream flow only, assuming Centennial Reservoir storage will be used to augment minimum flow releases from Rollins Reservoir to meet the full Combie Phase I Canal demand. This modification to Rollins Reservoir operations allows Rollins to reserve more water in carryover storage to offset drought impacts to NID and PG&E deliveries sourced by water from the Bear River Canal.

Additional detail on with and with-project conditions are found in the Benefit Calculation, Monetization, and Resiliency Tab, A.1 Project Conditions.

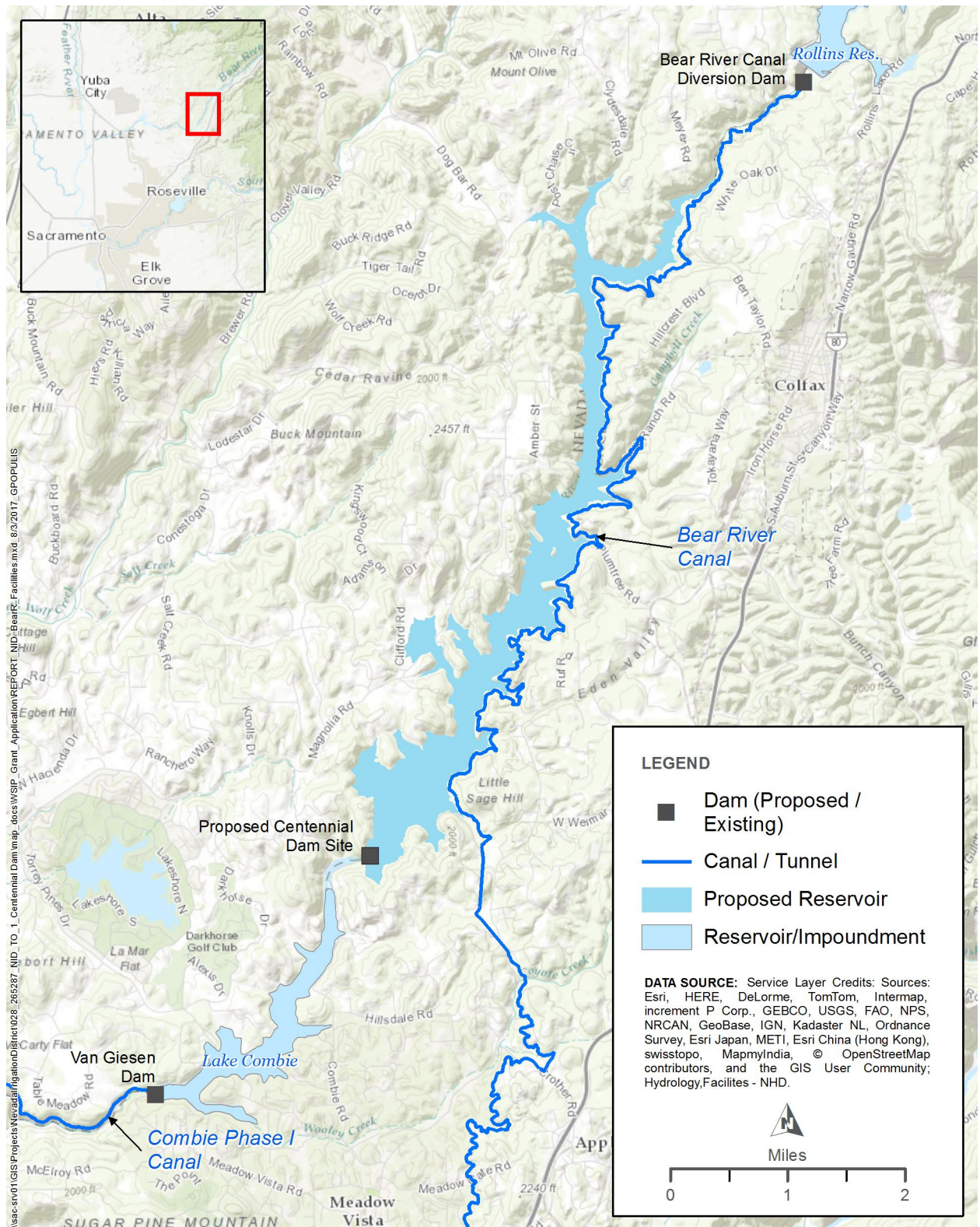


Figure 2: Bear River facilities map.

4. Describe how the added quantity of water in the water system due to the project, or other metric, is important to increasing water system reliance and achieving public benefits.

Future increases in water demand within NID's service area coupled with anticipated events, such as drought and climate change, create challenges for NID in maintaining a sustainable water system. In order for NID to continue to provide a dependable and quality water supply, additional water storage is needed to enhance NID's water supply management capabilities. The proposed project is primarily a water supply project intended to supplement NID's available water supply in dry years and in multi-year droughts. Under coordinated operations with Centennial Reservoir, Rollins Reservoir storage remains higher, particularly in drier years, contributing to increased carryover storage and deficit reductions in both the Bear River Canal and Combie Phase I Canal deliveries, as compared to Without-project conditions.

In addition to non-public water supply benefits, the project also provides ecosystem (Physical Public Benefits Tab, A.1 Ecosystem Priorities Worksheets) and recreation public benefit (Physical Public Benefits Tab, A.2 Recreation Studies). Rollins Reservoir recreation benefits are enhanced when reservoir water levels are higher during the May through September period when recreation demand is highest. Centennial Reservoir is able to maintain recreation and in-reservoir ecosystem benefits in all but the driest of years under 2030 and 2070 conditions.

5. Describe the project's ability to contribute to sustainable groundwater management.

On May 10, 2017, NID's Board of Directors adopted a resolution establishing NID's membership in the West Placer Groundwater Sustainability Agency, the Groundwater Sustainability Agency responsible for implementing the California Sustainable Groundwater Management Act of 2014 (SGMA) in a portion of the North American Sub-Basin located in western Placer County. The District is contributing technical expertise and funding towards basin management activities. The District does not utilize groundwater as an existing or planned source of water due to limited groundwater availability within NID's service area (per California Department of Water Resources, Bulletin 118). The Proposed Project is not expected to directly contribute to sustainable groundwater management, but may provide the opportunity for regional conjunctive use.

6. Describe the project's ability to expand beyond its current capacity including any planned phases of expansion and explain the current status of any expansion described.

The dam height at Centennial is limited by topographical constraints between the Bear River and Wolf Creek watersheds, therefore the size of the reservoir cannot be any larger. If expansion were needed, NID would consider other measures as part of a water supply program.

7. Describe the physical and economic magnitude of public and non-public benefits.

The benefits of the proposed project include non-public benefits of water supply and public benefits of ecosystem habitat and recreation visitation days. The physical and economic magnitude of these benefits are summarized in Table 1 and presented in detail in the Benefits Monetization Tab.

Table 1. Physical and Economic Benefits

Benefit Type	Physical Benefit – 2030 conditions with climate change	Physical Benefit – 2070 conditions with climate change	Economic Benefit over the planning horizon (2015 Dollars)
Non-public Benefit – Water Supply	3.8 TAF	11.2 TAF	\$221 million
Public Benefit – Ecosystem Habitat	201 acres of net wetlands created	201 acres of net wetlands created	\$5 million
Public Benefit – Recreation	277,683 visitor days per year	277,683 visitor days per year	\$45 million

8. Describe other relevant information the applicant deems necessary to inform the Commission.

The proposed project is still in the development stages. The construction of the proposed project will lead to several public benefits, including some that, at this time have not yet been fully evaluated and therefore, cannot yet be monetized. However, an environmental document and feasibility study are still under development. These studies would involve more field surveys and numerical modeling to fully quantify these benefits, but it is anticipated that all of the benefits once quantified, if possible, would justify the costs of the project.